

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Unity Sweaters Ltd.
Address of the Factory	: Ambag, Konabari, Gazipur.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 7 th March, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 7 th March, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 7 th March, 2015
BGMEA Membership No.	: 5685

BASIC INFORMATION:

The assessed factory building is a 6- storey RCC building where the lower 3 floors were operational and top 3 floors were under construction. The frame system of the building is beam-slab system. The following information was noted:

i. Building Usage Type	: Sweater Factory.
ii. Structural System	: R.C.C Beam-Column Frame Structure.
iii. Floor System	: Beam Slab.
iv. Floor Area	: The Typical plinth area 6336 sft & total area 39017.28 sft.
v. No. of Stories	: 6 Storey
vi. Construction Year	: 2012
vii. Foundation Type	: Shallow foundation (As per structural drawing).
viii. Design Drawings	: Available (Approval for 3 storey building on 20th March, 2013 from Gazipur Pouroshova)
ix. Soil Investigation Report	: Available.
x. Construction Materials	: Brick aggregate (Identified by removing Plaster).
xi. Generator	: Situated at the East south of the factory building in a separate shed area consisting 577.5 sft.

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for both Structural and Fire & Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

The recommendations for **Structural Safety** corrective action are:

Short Term (Immediate) : None

Mid Term (6-weeks) :

- Factory Engineer to review design, loads and columns stresses in all columns.
- Verify in-situ concrete stresses either by 100mm dia. cores or existing cylinder strength data for D4 column or 100mm dia. cores from 4 columns.

Long Term (6-months) :

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- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
- Unapproved floors need to be checked by building engineer and as built architectural and engineering drawing to be prepared and submitted for approval from appropriate authority.
- Beams need to be checked by building engineer for honeycomb appearance.
- Exposed reinforcement need to be covered by lean graded concrete as directed by building engineer.
- The connections of steel structure and requirement of cross bracing needs to be checked by building engineer. The bracing system is required to ensure the stability of the structure.

The recommendations for **Fire & Electrical Safety** corrective action are:

(A): Recommendations for Fire Safety corrective actions:

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<p>N/A</p>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Remove all temporary items from all escape routes, aisles and passageway. • Provide aisle marking with arrow guiding and exit signage on all Evacuation pathways or provided with overhead signage fixed at ceiling level. <ul style="list-style-type: none"> - Illuminated exit sign should be posted above the exit door, - It should be clearly visible at all time, - Provide directional signs wherever necessary. - All exit doors should be clearly marked for easy identification. -Signage should be uniform. • Periodically check alarm call points, alarm & detection system - Maintain the record properly. • Provide fire extinguisher at production floors, godown section and to keep the record for re filling & properly tagged. • Fire drill should be conducted quarterly (4 times a year) in existing buildings as detailed under the Fire Safety

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	Plan & should kept record properly.
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Replace all existing exit doors on evacuation routes, exit doors with side hinged type door, which swing outward and in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter. • Remove all locking device from all egress door. All exit doors should be open-able from the side they serve without the use of a key. • Provide handrails on both side of each stairway with height of 0.9m measured from the nose of stair to the top of the handrail. • Doors in stair should be outward opening, side-swing, self-closing, non-lockable 1.5 hours fire rated doors in all stair way encloses. • Provide 2 hour fire rated construction at unprotected opening window, which is adjacent to external staircase. • Prepare proper plan and design for fire rated barrier for 2 hour fire rating separated corridor with 1.5 hrs fire rated door at ground floor. • Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor generator & Boiler room, which located at the adjacent to production building. • The egress paths should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for all corridors & exit doors. Aisles should be provided with a minimum 2 lux. • The stairway should be illuminated with emergency lighting with power back-up supply & illumination should be a minimum of 10 lux for stairway. • Design and plan to provide automatic detection system with automatic fire alarm. • Install Manual activation call point at all exit routes • Design and plan to install dedicated fire pump with alternate backup power supply. • Plan and design to provide dedicated water storage tank

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	<p>for firefighting operation</p> <ul style="list-style-type: none"> • Power backup supply should be provided for fire alarm system. • Visual fire alarm should be place at Generator room • Obtain building approval from issuing authority • Obtain the boiler license from the proper issuing authority. • Obtain the boiler operator license from the proper issuing authority.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • All stairway to have direct access to outside of the factory building, which requires 2 hour fire rated construction with 1.5 hrs fire rated door at ground floor for fire separated corridor. • Provide fire 4 hours rated barriers with 2 hours fire rated doors at ground floor generator & Boiler room, which located at the adjacent to production building. • Install automatic detection system with automatic fire alarm. • Install dedicated fire pump with alternate backup power supply. • Provide sufficient number of hose pipe with respect to area and travel distance as per RMG guideline. • Provide dedicated storage tank for firefighting operation.

(B): Recommendations for Electrical Safety corrective actions:

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • Over current protection devices (Circuit breakers) should be installed at all distribution panels.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Re-locate oil / fuel tanks away from control panels in generator room. • Provide weather proof casing for switchboards exposed to weather (located outside the building). • Provide proper separate earthing/grounding to generator. Ensure that generator body frame to have two separate and distinct connections to the earth / ground.

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<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none">• 1. Provide updated SLD matching the existing installation at the factory.2. SLD to indicate exact positions of all points of switch boxes and other outlets.3. SLD to be approved by the engineer-in-charge.• 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc.2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation.3. As built drawing to be approved by the engineer-in-charge.• Necessity and capacity of the electrical substation shall be set by regulations in the Electricity Act or by the relevant electrical utilities.• All unwanted materials should be removed from transformer / Generator room.• Provide rubber mats of adequate size in front of all distribution panels.• Install smoke detection and provide firefighting equipment in the substation and generator room.• 1. Exit signs should be illuminated either by lamps external to the sign or by lamps contained within the sign.2. The source of illumination should be providing not less than 50 lux.• 1. Remove all the inflammable materials from surrounding of electrical circuitry at MDBs/SDBs.2. Ensure that all electric circuitry clean of inflammable materials.3. Conduct periodic maintenance and maintain the records.• The electrical panels to be of metal case and should be marked with “Danger 415 Volts” and identified with proper phase marking and danger signage.
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	<ul style="list-style-type: none"> • Provide proper clearance of 0.8 - 1.0 m in front of all distribution panels/switchboards. • Provide cable connections with properly soldered / welded lugs at (LT/MDB/DB/SDB)'s. Ensure that all the electrical connections are properly secured with lugs and glands. Select conductors and MCCB/MCB with adequate sizing without exceeding permissible current carrying capacity for insulation. • Avoid looping and bunch of cable at MCCB/MCB or bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards. • Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases. • Provide cable joints of porcelain / PVC connectors with PIB tape wound around before placing the cable in the box. • Seal the cable penetrations through walls adequately with fire resistive elements. • Provide separate earthing connection to electrical equipments. Ensure that earth potential provided for all parts of equipment / installation (other than live parts) and that continuous earth connection is provided back to the main intake supply earth. • Provide adequate earthing to body and doors to all MDBs / DBs. Ensure that all electrical panels provided with proper and separate earth potential.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • Provide 4 hour fire rated walls all around the transformer / generator room on ground level. • 1. Design to have proper segregation of different end used loads. 2. Wiring design to have separate and distinct sub-circuits for power and heating system. 3. All DBs to be placed conveniently. 4. Wiring to be neat, tidy and located near ceiling. • Relocate the MDBs with easy access. Ensure that all

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	<p>MDBs / SDBs should have easy accessibility.</p> <ul style="list-style-type: none">• Energy meters should be installed at convenient height (At least 1.5 m above ground) with proper protection.• Review capacity of standby generator on basis of loads for essential lighting / AC / Equipment / Services. Replace generator with larger capacity or install second generator if review indicates existing unit is too small.• 1. Wooden switchboards / panel boards should be replaced by non-flammable materials. 2. Prefer switchboards made of non-flammable materials.• Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).• Provide the wiring in PVC conduits or in metallic GI pipes. Ensure that all electrical wiring should be covered in proper conduit pipes.• Seal the cable entry-exit points of (LT/MDB/DB/SDB)'s with non-flammable materials. In addition:<ol style="list-style-type: none">1. Ensure that HT / LT panels / Switchgears to be vermin / damp proof.2. Ensure all unused holes / openings in DBs to be blocked properly.• 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5. 2. Ensure that connections between conductors / equipment's provided to durable electrical continuity and adequate mechanical strength and protection. 3. The continuous earth connection is provided back to the main intake supply earth.• Provide adequate protection against lightning depending on the probability of a strike and acceptable risk levels at roof top of building.
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